

## **TECHNICAL UPDATE POLICY # [INSERT]**

### **Updates:**

*“Indoor Air Background” Concentrations (1992)*

Sections 5.9 and 8.7, *Indoor Air Sampling and Evaluation Guide*,  
WSC Policy #02-430 (April, 2002)

Section 2.3, *Guidance for Disposal Site Risk Characterization*,  
WSC/ORS #95-141 (1995)

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## **Using Upper Percentile Values Within The Range Of Typical Indoor Air Concentrations At Residences and Schools**

### **1) Introduction**

#### **Summary and Purpose**

In 2006, MassDEP determined that the list of “Indoor Air Background” concentrations it had published in 1992 required updating. Indoor air values are one element in determining whether observed concentrations of oil or hazardous materials (OHM) in indoor air are the result of a vapor intrusion pathway. At that time, MassDEP cautioned the regulated community not to rely upon the 1992 list and directed the regulated community to rely upon more current published indoor air studies in combination with other site-specific lines of evidence when evaluating indoor air concentrations.

A team consisting of MassDEP staff from the Bureau of Waste Site Cleanup (BWSC) and Office of Research and Standards (ORS) was convened to address issues related to indoor air contamination and vapor intrusion pathways. In addition, an Indoor Air Workgroup (Workgroup) consisting of MassDEP staff representatives from the Massachusetts Department of Public Health, environmental and scientific professionals, and other interested stakeholders was convened in January 2007 to update indoor air data sets.

This document presents the results of the work conducted by the Workgroup. It includes a list of Upper Percentile Values (UPVs) within the range of typical indoor air concentrations that may be used as one line of evidence in determining whether indoor air concentrations in a given residential or school structure are, or are not, the result of a release of OHM to the environment. This document also includes MassDEP’s guidance on how to use the list of UPVs to support response action decisions.

### Distinguishing Between the Terms “Background” and “Range of Typical Indoor Air Concentrations”

In the context of the MCP, "background" is the level of OHM present at a location absent a release to the environment. “Background” levels do not require mitigation under the MCP.

"Background" in any particular medium is typically determined by measuring the levels of OHM in nearby, similar areas that have not been affected by a release of OHM. For soil and groundwater, "background" concentrations can be determined by collecting samples from nearby, similar, unaffected properties. However, “background” indoor air concentrations are not as easily determined. Due to variations in building materials, use of consumer products, ventilation rates, and other factors, concentrations of OHM observed in nearby, unaffected structures may be completely different – much higher or much lower – than in the building under investigation. Therefore the practical definition of "background" for indoor air is what is present in any given structure, absent a migration pathway related to a release.

There are a number of factors to be considered when evaluating whether or not a vapor intrusion pathway exists at a site. One factor is the range of OHM concentrations that have been observed in reasonably comparable buildings in large-scale scientific studies. As used in this document, the phrase “range of typical indoor air concentrations” means the levels of OHM in indoor air that fall within a range of concentrations commonly observed in residences, absent a release. “Typical indoor air concentrations” are not identical to “background” because they are not site specific and comprise only one line of evidence in determining the presence/absence of a vapor intrusion pathway.

If concentrations of all OHM fall within the range of typical indoor air concentrations, this comparison, *supplemented with other site-specific information*, may be used to support the conclusion that the observed concentrations of OHM are not the result of a vapor intrusion pathway. This migration/exposure pathway can then be eliminated from the site risk assessment. The elimination of the vapor intrusion pathway results in an endpoint that is consistent with the practical definition of "background" for indoor air assuming, of course, that the indoor air is not impacted by a release through a different pathway.

## **2) Methodology Used to Establish Upper Percentile Values Within the Range of Typical Indoor Air Concentrations**

The following methodology was used to identify the range of typical indoor air concentrations and to establish UPVs within the range of such concentrations:

1. Identified and acquired studies that quantify concentrations of chemicals in residential indoor air (study locations were unaffected by a release of OHM to the environment);
2. Developed evaluation criteria to determine the quality and applicability of the studies;
3. Reviewed each study and applied the evaluation criteria to identify the most appropriate studies to be used by MassDEP in determining the range of typical indoor air concentrations;
4. Developed risk management criteria to be used as the basis for selecting specific percentile values of typical indoor air concentrations as MassDEP's UPVs;
5. Determined 75<sup>th</sup> and 90<sup>th</sup> percentile values from the datasets and the analytical reporting limit for each chemical; and
6. Selected either the 75<sup>th</sup> or 90<sup>th</sup> percentile value or the reporting limit as the UPV, based on the risk management approach.

### **Identification of Studies**

The Workgroup initially solicited available datasets of indoor air collected using stainless steel SUMMA canisters and analyzed by means of appropriate and scientifically defensible EPA Toxic Organic (TO) and MassDEP Air-Phase Petroleum Hydrocarbons (APH) methodologies. The universe of data sets was eventually expanded to include a number of studies conducted using passive samplers (e.g., 3M Badges) and sorbent tubes. Over 100 indoor air studies were identified and/or provided to the Workgroup for consideration.

### **Evaluation Criteria**

The evaluation criteria developed and applied by the Workgroup to identify the most appropriate studies to be used by MassDEP in determining the range of typical indoor air concentrations are as follows:

#### **“Screen In” Criteria for Indoor Air Studies**

- 1) Primary studies
- 2) Residential studies
- 3) Geography and climate similar to Massachusetts
- 4) Construction of homes similar to Massachusetts
- 5) Samples collected with SUMMA canisters, 3M badges, and/or sorbent tubes using current state-of-the-art methodologies
- 6) Samples collected from basement and living spaces
- 7) Large volume of data

- 8) Analytical sensitivity (i.e., low Method Detection Limits (MDLs))
- 9) Ambient air data collected for comparison

#### “Screen Out” Criteria for Indoor Air Studies

- 1) Occupational studies (e.g., drycleaners, etc.)
- 2) OHM release related (e.g., volatile organic compound (VOC) plume)
- 3) Dated studies (data collection pre-1990)
- 4) European studies and those exhibiting strong geographic bias (e.g., Vermont study very rural)
- 5) Unknown sampling/analytical methodology
- 6) Dated grab samples, and those collected to evaluate occupational exposures
- 7) Presence of atypical indoor sources (unusual use/overuse of product)
- 8) Non-VOC data
- 9) Total VOC only data
- 10) Study unobtainable
- 11) Elevated MDLs

#### Application of Evaluation Criteria

By applying the evaluation criteria to the indoor air studies identified by the Workgroup, seven studies were selected as the best datasets to be used by MassDEP in determining the range of typical indoor air concentrations. See Attachment A for the list of studies.

Together, these seven studies provide significant lists of analytes, a large number of sample points, generally low method detection limits, and appropriate quality assurance and quality control (QA/QC). These studies also have greater than 25% detection rates for many of the analytes, reported the 75<sup>th</sup> and 90<sup>th</sup> percentiles, and were conducted in residences.

#### Use of Risk Management Criteria to Select Appropriate Upper Percentile Values

MassDEP used the risk management approach described below in determining the appropriate UPVs for common site contaminants. This approach was applied to the datasets from the selected studies to develop the list of UPVs.

- The 90<sup>th</sup> percentile value within the range of typical indoor air concentrations was identified;
- The cancer and non-cancer risks associated with the 90<sup>th</sup> percentile value were estimated;
- If the risk estimates for 90<sup>th</sup> percentile value did not exceed MassDEP’s risk management criteria, then the 90<sup>th</sup> percentile value was chosen. *The risk management criteria used in this document are the same as those used to develop MCP Method 1 Standards (Excess Lifetime Cancer Risk of 1-in-1*

*million and a Hazard Index equal to 0.2). Cancer and non-cancer risk estimates were based on a conservative residential exposure scenario;*

- If the risk estimates for the 90<sup>th</sup> percentile value exceeded the risk management criteria, then the 75<sup>th</sup> percentile value was chosen;
- The cancer and noncancer risks associated with the 75<sup>th</sup> percentile value were estimated; and
- If the risk estimates for the 75<sup>th</sup> percentile value exceeded the risk management criteria, then the chemical was flagged as one for which multiple lines of evidence are needed to confirm or refute the presence of a vapor intrusion pathway based upon the weight of the evidence.

A risk management approach was also used to determine the appropriate UPVs for chemicals that were either non-detects (NDs) in all of the selected studies or were detected less than 10% of the time (and therefore do not have an associated 75<sup>th</sup> or 90<sup>th</sup> percentile value). The following methodology was used to determine the UPVs in such circumstances<sup>1</sup>:

- Analytical reporting limits using the MassDEP APH Method or the TO-15 Method (Scan Mode) for the chemicals were obtained from three laboratories<sup>2</sup>;
- For each chemical, the cancer and non-cancer risks associated with the highest of the three reporting limits were compared to the risk management criteria;
- If the risk estimates for the highest reporting limit exceeded the risk management criteria, then the lowest of the three reporting limits was chosen;
- If the risk estimates for the lowest reporting limit exceeded the risk management criteria, then the chemical was flagged as one for which multiple lines of evidence are needed to confirm or refute the presence of a vapor intrusion pathway based upon the weight of the evidence.

<sup>1</sup> A modified approach was used for the C<sub>9</sub> to C<sub>10</sub> Aromatics, as this fraction represents a range rather than an individual chemical, and calculation of the reporting limit is less standardized. For the C<sub>9</sub> to C<sub>10</sub> Aromatics, the highest of the three reporting limits was selected. If the risk estimate for the highest reporting limit exceeded the risk management criteria, then it was flagged as one for which multiple lines of evidence are needed to confirm or refute the presence of a vapor intrusion pathway based upon the weight of the evidence.

<sup>2</sup> Accutest, Alpha Analytical and Test America

### Selecting an Appropriate Percentile Value: Why the 75<sup>th</sup> and 90<sup>th</sup> Percentile Values Were Chosen

Due to the variability of indoor air concentrations of chemicals in buildings, MassDEP used the cumulative frequency distribution data to evaluate the concentrations of chemicals in indoor air. Percentiles from these distributions may be obtained from any systematic study that compiles chemical-specific groups of concentration values. A percentile value  $p$  represents the number in a group of numbers such that  $p$  percent of the numbers in that group are at that number or below. For example, a 90<sup>th</sup> percentile concentration for a chemical represents a value for which ninety percent of buildings sampled have indoor air with concentrations of this chemical at or below the reported value. Such percentile data allow for the comparison of indoor air sampling results from a specific building to the collective range of indoor air concentrations monitored in a number of comparison buildings.

In selecting an appropriate percentile value within the available distributions of data, MassDEP attempted to strike a balance between correctly identifying residences impacted by a 21E release and correctly excluding non-impacted residences that are truly characteristic of typical indoor air. The ranges of typical indoor air concentrations and potentially site-related concentrations overlap, so it is not possible to identify a percentile below which concentrations are unlikely in all cases to be site-related *and* above which concentrations are likely in all cases to be site related. Choosing a lower percentile increases the likelihood of erroneously concluding that a detected concentration is site-related, while choosing a higher percentile increases the likelihood of erroneously concluding that a detected concentration is not site-related.

In order to minimize the expense and effort involved in addressing indoor air chemical concentrations that are not the result of a 21E release, a decision was made to select a value in the upper range of percentiles, thus increasing the confidence level that a site that is identified to be impacted truly is impacted by a 21E release. This approach, combined with the risk management criteria discussed above, results in UPVs that are both pragmatic and protective.

### Determining the 75<sup>th</sup> and 90<sup>th</sup> Percentile Values for Chemicals Detected in the Selected Studies

For purposes of determining the 75<sup>th</sup> and 90<sup>th</sup> percentile values for chemicals that were detected in the selected studies, MassDEP used only measured (not extrapolated) values. The use of measured values best ensured the accuracy of the data, since the manner in which NDs were reported<sup>3</sup>, and the detection limits<sup>4</sup>, varied from study to study.

<sup>3</sup> For example, some studies substituted the detection limit, or half the detection limit, for reported NDs. Other studies used statistical approaches to estimate a distribution of results below the detection limit or simply reported the value as “< DL.”

<sup>4</sup> Since studies with higher detection limits reported a lower rate of detection, the availability of a given percentile value depended on both the prevalence of a chemical in indoor air and the

MassDEP believes that relying upon the accuracy of reported percentile values that are estimated concentrations below a study's limit of detection, or using a simplistic approach to estimate the missing percentile value (such as using half the detection limit), may actually decrease the accuracy of the resulting UPVs and is not necessary where there are sufficient *measured* values in other studies. Accordingly, MassDEP used the following methodology to determine the 75<sup>th</sup> and 90<sup>th</sup> percentile values for chemicals with measured values:

- For each chemical, the 75<sup>th</sup> and 90<sup>th</sup> percentile values from each study were identified, to the extent the study reported the 75<sup>th</sup> and/or 90<sup>th</sup> percentile values of its data;
- Each value was compared to the study's Detection Limit, and values falling below the reported Detection Limit were eliminated from consideration; and
- For each chemical and for each targeted percentile value (the 75<sup>th</sup> and 90<sup>th</sup> percentiles), the median of the available study percentile values was determined. The median value, rather than the mean, was used because outliers can dramatically impact the mean, whereas the median is less affected by outliers. Only actual measured results were considered in determining the median.

### **3) Mass DEP's Guidance Concerning the Application of Upper Percentile Values in Evaluating Indoor Air at Residences and Schools**

Having established the list of UPVs, set forth below is MassDEP's guidance on how to use the UPVs to support response action decisions related to residences and schools.

Comparison of site-specific indoor air measurements to UPVs *alone* may not be used to rule out the presence of a vapor intrusion pathway. However, as described below, comparison of site-specific indoor air measurements to UPVs, *in combination with other site-specific information*, may be used to support a conclusion that the observed concentrations of OHM are not the result of a vapor intrusion pathway and thus this migration/exposure pathway may be dropped from the site assessment and risk characterization.

Note that vapor intrusion pathways may still be present at sites where indoor air concentrations are at or below UPVs. However, MassDEP will not require persons conducting response actions to undertake assessment or mitigation work to address these pathways as long as the concentrations measured in indoor air are at or below UPVs and the risk management criteria *and* the results of this comparison are consistent with other relevant site information.

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study's detection limit. For example, if a chemical was detected in only 15% of the samples analyzed in a given study, then a 90<sup>th</sup> percentile value could be identified (requiring at least a 10% detection rate), but not a 75<sup>th</sup> percentile value (which requires at least a 25% detection rate).

The UPVs established by MassDEP are set forth in Attachment B and may be used as follows:

1. To determine the need to obtain additional lines of evidence (e.g., soil gas) necessary to confirm or refute the presence of a vapor intrusion pathway or Critical Exposure Pathway, in cases where only indoor air data exist; and/or
2. As a discrete element in a lines-of-evidence evaluation, in cases where multiple assessment elements have been generated (e.g., groundwater, soil, soil gas, models, etc).

#### Critical Exposure Pathway Evaluation

Where all indoor air contaminants associated with the disposal site are **at or below non-bolded** UPVs listed in Attachment B, further investigation for purposes of making determinations on vapor intrusion or the existence of a Critical Exposure Pathway is not necessary. This assumes that the results of this comparison are consistent with other site information and that adequate testing has been conducted to obtain representative indoor air concentrations, including expected “worst case” conditions.

Where one or more indoor air contaminant(s) associated with the disposal site **exceeds a bolded or non-bolded** UPV listed in Attachment B, it is presumed that a vapor intrusion pathway exists. Therefore, response actions are necessary to eliminate or mitigate the Critical Exposure Pathway where feasible. However, this presumption that a vapor intrusion pathway exists may be rebutted by the weight of multiple lines of evidence from site-specific investigations.

Where one or more indoor air contaminant(s) associated with the disposal site is **at or below bolded** UPVs and **above the risk management criteria** listed in Attachment B, it is necessary to obtain multiple lines of evidence to confirm or refute the presence of a vapor intrusion pathway. A comparison to UPVs alone may not be used to rule out the presence of a vapor intrusion pathway because bolded UPVs exceed MassDEP’s risk management criteria (e.g., Excess Cancer Risk) even at levels typically present within indoor air. If a vapor intrusion pathway is confirmed, then all of the contaminants within indoor air associated with the disposal site must be incorporated into further site assessment and risk characterization.

Where all indoor air contaminants associated with the disposal site are **at or below bolded** UPVs and **at or below the risk management criteria** listed in Attachment B, further investigation for purposes of making determinations on vapor intrusion or the existence of a Critical Exposure Pathway is not necessary. This assumes that the results of this comparison are consistent with other site information and that adequate testing has been conducted to obtain representative indoor air concentrations, including expected “worst case” conditions.

### Response Action Outcome

Where all indoor air contaminants associated with the disposal site are **at or below non-bolded** UPVs listed in Attachment B, vapor intrusion may be eliminated as a pathway in characterizing disposal site risk to support an RAO.<sup>5</sup> This assumes that the results of this comparison are consistent with other site information and that adequate testing has been conducted to obtain representative indoor air concentrations, including expected “worst case” conditions.

Where one or more indoor air contaminant(s) associated with the disposal site **exceeds a bolded or non-bolded** UPV listed in Attachment B, it is presumed that a vapor intrusion pathway exists. Therefore, all of the contaminants within indoor air associated with the disposal site must be incorporated into further site assessment and risk characterization. However, this presumption that a vapor intrusion pathway exists may be rebutted by the weight of multiple lines of evidence from site-specific investigations.

Where one or more indoor air contaminant(s) associated with the disposal site is detected at concentrations **at or below bolded UPVs** and **above the risk management criteria** listed in Attachment B, it is necessary to obtain multiple lines of evidence to confirm or refute the presence of a vapor intrusion pathway. A comparison to UPVs alone may not be used to rule out the presence of a vapor intrusion pathway because bolded UPVs exceed MassDEP’s risk management criteria (e.g., Excess Cancer Risk) even at levels typically present within indoor air. If a vapor intrusion pathway is confirmed, then all of the contaminants within indoor air associated with the disposal site must be incorporated into further site assessment and risk characterization.

Where all indoor air contaminants associated with the disposal site are **at or below bolded** UPVs and **at or below the risk management criteria** listed in Attachment B, vapor intrusion may be eliminated as a pathway in characterizing disposal site risk to support an RAO.<sup>6</sup> This assumes that the results of this comparison are consistent with other site information and that adequate testing has been conducted to obtain representative indoor air concentrations, including expected “worst case” conditions.

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<sup>5</sup> The basis for eliminating this pathway must be documented in the Phase II Report and/or Response Action Outcome Statement.

<sup>6</sup> The basis for eliminating this pathway must be documented in the Phase II Report and/or Response Action Outcome Statement.

## ATTACHMENT A

### List of Selected Studies

Adgate, J.L., et al. Personal, Indoor, and Outdoor VOC Exposures in a Probability Sample of Children. *Journal of Exposure Analysis and Environmental Epidemiology* (2004) 14, S4-S13.

Clayton, C.A., et al., National Human Exposure Assessment Survey (NHEXAS): distributions and associations of lead, arsenic, and volatile organic compounds in EPA Region 5. *Journal of Exposure Analysis and Environmental Epidemiology* (1999) 9, 381-392.

New York State Department of Health CEH BEEI Soil Vapor Intrusion Guidance 2006. Appendix C: Volatile organic chemicals in air - summary of background databases.

Rago R, McCafferty R and Rezendes 2005. Haley and Aldrich, Summary of Residential Indoor Air Quality Data, Massachusetts Indoor Air background Study.

Sexton K., Adgate J.L., Ramachandran G., Pratt G.C., Mongin S.J., Stock T.H., and Morandi M.T. 2004. Comparison of personal, indoor, and outdoor exposures to hazardous air pollutants in three urban neighborhoods. *Environ Sci Technol* 38:423–430.

Weisel, Clifford P, Junfeng Zhang, et al. 2005. Relationships of Indoor, Outdoor, and Personal Air (RIOPA). Part I, Collection Methods and Descriptive Analyses. Health Effects Institute. Research Report 130 (Pt. 1): 1-127.

Weisel 2006. Investigation of Indoor Air Sources of VOC Contamination - Final Report Year 2. Submitted to NJDEP Oct 2006. Report #SR03-033.

## ATTACHMENT B

Chemical	CAS no.	Risk Management Criteria		Reported Percentiles from Studies ( $\mu\text{g}/\text{m}^3$ )		Analytical Laboratory Reporting Limits			UPV Rounded		Multiple Lines of Evidence Required
		HI = 0.2 $\mu\text{g}/\text{m}^3$	ELCR = $1 \times 10^{-6}$ $\mu\text{g}/\text{m}^3$	75th%	90th%	Accutest $\mu\text{g}/\text{m}^3$	Alpha Analytical $\mu\text{g}/\text{m}^3$	Test America $\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	ppbv	
ACETONE	67-64-1	160		52	91	1.2	5.9	1.2	91.0	38.0	
BENZENE	71-43-2	6	0.3	3.28	11.475	1.6	0.6	0.6	<b>3.3</b>	<b>1.0</b>	*
BROMODICHLOROMETHANE	75-27-4	14	0.14	ND	ND	3.3	1.3	1.3	<b>1.3</b>	<b>0.2</b>	*
BROMOFORM	75-25-2	14	2.2	ND	ND	5.2	2.1	2.1	2.1	0.2	
BROMOMETHANE	593-60-2	1		ND	0.6	2.2	0.8	0.8	0.8	0.2	
CARBON TETRACHLORIDE	56-23-5	86	0.16	0.59	0.855	1.3	1.3	1.3	<b>1.3</b>	<b>0.2</b>	*
CHLOROBENZENE	108-90-7	4		ND	ND	2.3	0.9	0.9	2.3	0.5	
CHLOROFORM	67-66-3	130	0.11	2.4	3.01	2.4	1.0	1.0	<b>2.4</b>	<b>0.5</b>	*
DIBROMOCHLOROMETHANE	124-48-1	14	0.1	ND	ND	4.3	1.7	1.7	<b>1.7</b>	<b>0.2</b>	*
DICHLOROBENZENE, 1,2- (o-DCB)	95-50-1	40		ND	0.72	3.0	1.2	1.2	3.0	0.5	
DICHLOROBENZENE, 1,3- (m-DCB)	541-73-1	40		ND	0.6	3.0	1.2	1.2	3.0	0.5	
DICHLOROBENZENE, 1,4- (p-DCB)	106-46-7	160	0.35	0.72	1.5	3.0	1.2	1.2	<b>1.2</b>	<b>0.2</b>	*
DICHLOROETHANE, 1,1-	75-34-3	100		ND	ND	0.8	0.8	0.8	0.8	0.2	
DICHLOROETHANE, 1,2-	107-06-2	11	0.09	ND	ND	0.8	0.8	0.8	<b>0.8</b>	<b>0.2</b>	*
DICHLOROETHYLENE, 1,1-	75-35-4	40		ND	ND	0.8	0.8	0.8	0.8	0.2	
DICHLOROETHYLENE, CIS-1,2-	156-59-2	7		ND	ND	0.8	0.8	0.8	0.8	0.2	
DICHLOROETHYLENE, T-1,2-	156-60-5	14		ND	ND	0.8	0.8	0.8	0.8	0.2	
DICHLOROMETHANE (MeCl)	75-09-2	600	5	4.17	11.015	1.7	1.7	1.7	4.2	1.2	
DICHLOROPROPANE, 1,2-	78-87-5	0.8	0.13	ND	ND	2.3	0.9	0.9	<b>0.9</b>	<b>0.2</b>	*
DICHLOROPROPENE, cis, 1,3-	10061-01-5	4	0.6	ND	ND	2.3	0.9	0.9	<b>0.9</b>	<b>0.2</b>	*
DICHLOROPROPENE, trans, 1,3-	10061-02-6	4	0.6	ND	ND	2.3	0.9	0.9	<b>0.9</b>	<b>0.2</b>	*

Chemical	CAS no.	Risk Management Criteria		Reported Percentiles from Studies ( $\mu\text{g}/\text{m}^3$ )		Analytical Laboratory Reporting Limits			UPV Rounded		Multiple Lines of Evidence Required *
		HI = 0.2	ELCR = $1 \times 10^{-6}$			Accutest	Alpha Analytical	Test America			
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	75th%	90th%	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	ppbv	
DIOXANE, 1,4-	123-91-1	24	0.59	ND	ND	1.8	3.6	18.0	<b>1.8</b>	<b>0.5</b>	
ETHYLBENZENE	100-41-4	200		2.75	7.4	2.2	0.9	0.9	7.4	1.7	
ETHYLENE DIBROMIDE	106-93-4	2	0.011	ND	ND	3.8	NR	1.5	<b>1.5</b>	<b>0.2</b>	*
HEXACHLOROBUTADIENE	87-68-3	0.1	0.11	ND	4.6	5.3	2.1	2.1	<b>2.1</b>	<b>0.2</b>	*
METHYL ETHYL KETONE	78-93-3	1000		5.3	12.1	1.5	1.5	1.5	12.0	4.1	
METHYL ISOBUTYL KETONE	108-10-1	600		0.86	2.2	2.0	2.0	2.0	2.2	0.5	
METHYL TERT BUTYL ETHER	1634-04-4	600		6.645	39.02	1.8	0.7	1.8	39.0	11.0	
METHYLNAPHTHALENE, 2-	91-57-6	10		ND	ND	2.9	8.0	NR	8.0	1.4	
NAPHTHALENE (mothballs)	91-20-3	0.61		ND	2.66	2.6	2.0	2.6	<b>2.0</b>	<b>0.4</b>	*
C5 to C8 Aliphatics	NOS	40		125.25	328.5	11	24	NR	<b>130.0</b>		*
C9 to C12 Aliphatics	NOS	40		110.25	221.7	18	28	NR	<b>110.0</b>		*
C9 to C10 Aromatics	NOS	10		ND	43.88	13	24.0	NR	<b>24.0</b>		*
STYRENE	100-42-5	200	4.1	0.97	1.35	2.1	0.9	0.9	1.4	0.3	
TETRACHLOROETHANE, 1,1,2,2-	79-34-5	19	0.041	ND	ND	1.4	1.4	1.4	<b>1.4</b>	<b>0.2</b>	*
TETRACHLOROETHYLENE	127-18-4	920	0.044	1.75	4.095	1.4	1.4	1.4	<b>1.8</b>	<b>0.3</b>	*
TOLUENE	108-88-3	1000		24.8	53.8	1.9	0.8	0.8	54.0	14.0	
TRICHLOROENZENE, 1,2,4-	120-82-1	40		ND	3.4	3.7	3.7	3.7	3.7	0.5	
TRICHLOROETHANE, 1,1,1-	71-55-6	1100		2.35	2.955	1.1	1.1	1.1	3.0	0.5	
TRICHLOROETHANE, 1,1,2-	79-00-5	15	0.15	ND	ND	1.1	1.1	1.1	<b>1.1</b>	<b>0.2</b>	*
TRICHLOROETHYLENE	79-01-6	36	1.4	0.8	0.8	1.1	1.1	1.1	<b>1.1</b>	<b>0.2</b>	*
VINYL CHLORIDE	75-01-4	20	0.27	ND	ND	0.5	0.5	0.5	<b>0.5</b>	<b>0.2</b>	*
XYLENES (Mixed Isomers)	1330-20-7	20		9.5	28	2.2	1.7	2.2	9.5	2.2	